Table 1 shows the reduction of observations made at Alhajuela by self-registering thermometer and barometer. Each day of these respective months is comprised in these observations. Alhajuela is about 18 kilometers above Gamboa, following the course of the river. The instruments are about 43 meters above sea level. The table is continued from page 463 of the October REVIEW.

OBSERVATIONS AT HONOLULU.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, the monthly report of meteorological conditions at Honolulu is now made partly in accordance with the new form, No. 1040, and the arrangement of the columns, therefore, differs from those previously published.

Meteorological observations at Honolulu, January, 1900.

The station is at 21° 18′ N., 157° 50′ W.

Pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours has always been measured at 10:29 p. m., not 1 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m., Greenwich time, or 2:29 a. m., Honolulu time.									Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	29.80	66	63.5	79	65	62.3	74	w.	3-0	1	29.84	29.74	0.00
2	29.86	64	62	79	62	61.3	73	w.	1	3	29.88	29.78	0.03
3	29.98	62	58.5	77	63	58.7	69	w.	2	2	29.98	29.90	0.00
4	30.00	61	60	79	60	59.0	71	w-n.	2-0	1-6-0	30.04	29.94	0.00
5	29.92	61	59.5	76	59	60.0	73	sw-w.	2	5	30.03	29.92	0.00
6	29.85	61	60	77	61	60.7	70	w-n.	1-0	6	29.92	29.84	0.06
7	29.84	70	65	77	59	63.0	83	se-sw.	1	6	29.92	29.81	0.05
8	29.97	68	66	80	64	65.7	76	ssw-sw.	2	6	29.97	29.84	0.04
9	30.05	64	60.5	79	67	66.5	82	sw-se.	1-4-0	7	30.09	29.96	0.00
10	30.04	71	68	81	63	62.5	72	sw-n.	1	1	30.13	30.00	0.01
11	29.99	72	66	80	69	64.5	71	ne.	3	3	30.09	29.99	0.00
12	30.00	72	65	78	71	63.3	69	ene-nne.	3	5	30.09	29.99	0.00
13	30.03	72	65	79	71	61.3	64	ne.	4	4	30.05	29.98	0.01
14	29.98	69	63.5	78	72	61.5	64	ene.	5	2	30.08	29.94	0.00
15	29.94	71	65	80	68	62.0	66	ne-se.	3-0	4-8	30.06	29.94	0.00
16	29.98	66	64	79	66	62.0	66	sw-w.	1-4	2-8	29.97	29.85	0.15
17	30.09	67	57	72	66	57.0	67	nnw-n.	3-5	3	30.09	29.95	0.00
18	30.10	69	61	75	66	51.5	52	nne.	3-6	3-1	30.16	30.05	0.00
19	30.05	71	63	76	68	56.5	60	ne.	5	3	30.15	30.03	0.00
20	30.02	70	63	78	69	58.3	61	ene.	4	3	30.08	29.99	0.00
21	29.95	71	64	77	69	60.7	64	ne.	3	3-5	30.04	29.94	0.00
22	29.94	68	63.5	79	69	61.3	64	ne-e.	3-1	4	30.01	29.91	0.00
23	29.95	61	59	78	65	61.5	74	e-sw.	1	9-0	30.02	29.90	0.00
24	29.99	66	64.5	79	60	61.5	75	sw-ne.	1	8-2	29.99	29.90	0.16
25	29.94	60	58	76	64	63.7	80	n-ne.	1	8-3	30.01	29.90	0.00
26	30.01	62	60.5	76	59	55.7	67	n.	1	5	30.04	29.94	0.04
27	30.08	62	57.5	70	61	57.5	74	nne.	2	8	30.10	30.00	0.05
28	30.11	65	60	75	61	55.5	63	ne.	1	2-8	30.18	30.06	0.00
29	30.05	64	57	77	63	57.3	66	nne.	2	5	30.13	30.01	0.08
30	29.97	68	60.5	75	59	52.5	54	nne-n.	3	1	30.06	29.97	0.00
31	30.03	67	63	76	66	56.7	62	ne.	5	4	30.03	29.97	0.06
Sums	......	......	......	......	......	......	......	....	......	......	......	.....	0.74
Means	29.98	66.4	62.0	77.3	64.7	60.0	68.6	....	2.5	4.1	30.040	29.934	....
Departure	+.043	......	......	......	......	—2.5	—8.0	....	......	—0.4	......	......	—2.46

Mean temperature for January, 1900 (6+2+9) ÷ 3=70.5°; normal is 70.1°. Mean pressure for January (9+3) ÷ 2 is 29.992; normal is 29.949.

* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 7:29 p. m., Greenwich time. ‡ These values are the means of (6+9+2+9) ÷ 4. § Beaufort scale.

Taking the sums of November and December, 1899, and January, 1900, the rainfall was the least on record (26 years) for the said months.

SOME OF THE RESULTS OF THE INTERNATIONAL CLOUD WORK FOR THE UNITED STATES.[1]

By FRANK H. BIGELOW, Professor of Meteorology.

The general scheme of the survey of the clouds proposed by the International Cloud Commission is so widely understood that it will not be necessary to describe it again, beyond saying that the observations undertaken by the United States Weather Bureau began on May 1, 1896, and ended on June 30, 1897, employing 1 primary base station, at Washington, D. C., and 14 nephoscope stations, distributed quite uniformly throughout the territory east of the Rocky Mountains. The computation of the resulting data and the arrangement for the publication follow closely the prescribed forms submitted in the circulars of the commission, and although the labor of preparation up to this point was considerable, there will be nothing of special interest to say regarding that portion of the report, the whole of which will form Part VI of the Report of the Chief of the Weather Bureau for 1898.

The possession of much new data, contained in the 6,600 single theodolite observations and in the 25,000 nephoscope observations, afforded, however, a favorable opportunity for considering several of the fundamental problems of meteorology, especially in view of the fact that they develop in the most perfect manner on the North American Continent, and therefore the discussion of the observations has been pushed far beyond the limits implied in the scheme of the commission. It will be admitted, no doubt, by all those who are conversant with the true state of meteorology that, in spite of much good work on the part of able investigators, there are still serious gaps in the series of facts needed to construct a sound theory of the history of cyclones and anticyclones; and, furthermore, that the existing theories are neither in agreement among themselves nor with all the known facts. It was important, therefore, to develop the facts regarding the circulation of the atmosphere without bias *ab initio;* and it was essential to so far correlate the existing mathematical analyses that their true relation as to one another and as to the results of the observations should appear. Meteorology must always remain, not a crude branch of science, as some writers erroneously maintain, but a difficult one, on account of the complications attending the physical processes and the fluid motions in the complex form presented by the atmosphere. We have attempted to show how some of the apparent obstacles can be overcome by employing the methods used in these observations and reductions, and the results are such as to stimulate students to continued efforts to finally resolve these interesting problems.

A STANDARD SYSTEM OF CONSTANTS AND FORMULÆ.

Part of the difficulty in making students generally realize that meteorological mathematics already stands upon a definite fundamental basis, is due to the fact that while many papers of great merit exist, they are detached from one another, and there is no well-defined system of formulæ which is common to all such related investigations. Professor Ferrel's treatises, it is true, in spite of his inattention to a consistent and clear notation, cover the ground, as he conceived the solution of the problem, in a consecutive order from beginning to end. Yet many of his primary developments are exceedingly complicated; other valuable mathematical analyses have been discovered since his day; his main theory of the local cyclone has been found to be loaded with objections, so that students have expected that before long improvements would be introduced. The German school of authors, including Guldberg and Mohn, Oberbeck, Sprung, Hann, and others, have followed substantially one line of thought, which is characteristic of them, and though they reach many results in agreement with Ferrel's, especially in regard to the general cyclone covering a hemisphere of the earth, they have in reality radically different conceptions regarding the structure of the local cyclone. Thus, in Ferrel's case, it was assumed that the general and the local cyclone are examples of the same type of circulation, wherein

[1] Reprinted from American Journal of Science, December, 1899.